



**Emissions Review on
T-Mobile Application for Variance for
a Wireless Communications Facility at
22 Griffin Road, Westford, Massachusetts**

16 July 2010

Broadcast Signal Lab was engaged by the Town of Westford to assist with the review of the T-Mobile application for variances for a Wireless Communications Facility (WCF) including a new tower, at 22 Griffin Road (Site). The applicant seeks a use variance as well as a variance from the 900-foot dwelling setback in the WCF bylaw (6.2.3) and from the 35 foot height limitation in the Table of Dimensional and Density Regulations (Appendix C). Applicant also seeks a variance to the limitation of not more than one principal structure on a lot (4.1.2).

This report addresses the sound and radio frequency emissions compliance of the proposed facility.

§6.2.10.1.c is an annual RF energy exposure assessment requirement after the facility is in operation – the submission of RF levels on the ground near the antenna supporting structure when the antennas are at the various elevations. §6.2.10.1.e also addresses RF emissions exposure, after construction.

The only application-oriented RF energy exposure criteria are contained in §6.2.6.13.c and 6.2.7.3.c (...describe actions that will be taken if the facility exceeds FCC RF energy exposure criteria), §6.2.7.5 (...expected RF emissions levels at nearest residence, etc.), and §6.2.9.11 (All WCF towers must comply with all applicable federal/state rules; annual certification).

It may be an oversight in the crafting of the bylaw, but the Application Requirements: New Towers (§6.2.6), has no clause that corresponds to the Application Requirements: Pre-existing Facilities (6.2.7) that calls for submission of “expected RF emission levels.” Although not required, the Board should decide if it is necessary to obtain such calculations for this proposed New Tower, covered by §6.2.6, not by 6.2.7.

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Meanwhile, the RF engineer for T-Mobile has certified in his report (under his para. 11.) that T-Mobile will comply with emissions regulations (§6.2.9.11). Further, He describes (under his para. 14.d) the protocol for resolving an out of compliance exposure condition, pursuant to §6.2.6.13.c.

The behavior of radio signals propagating from antennas, and specifically from wireless facility antennas, is well known. It is customary to evaluate the emissions using the extreme case analysis. Antennas behave like lenses, focusing the energy where it is needed most. This is typically toward the local horizon in order to obtain the best spread of the signal over the service area with least wasted energy close to the facility. The extreme case analysis assumes the horizontally pointed antenna is pointed vertically directly to the ground instead. This way the computation is based on the highest intensity of the antenna emission (like the center of a flashlight beam) assumed to be focused on the nearest accessible location (straight down).

The test for RF emissions exposure compliance of a new facility is pass-fail. As long as the emissions anywhere in the facility's influence cannot exceed the FCC requirements, the facility is compliant. If the extreme case analysis shows that the result is less than the FCC requirement, the facility will be inherently compliant at the nearest house, or any house, or the property line, or any other location of interest. It is customary to see an applicant submit an extreme-case analysis to verify whether there is no question the facility will be compliant. If the Board wishes to pursue the lowest possible antenna height, in addition to the proposed height, a second extreme-case computation can be done at the lowest possible height. There is no need to perform a series of extreme-case analyses at different heights if the lowest one demonstrates compliance. Based on our experience with measuring and calculating the emissions exposure from multi-carrier wireless facilities, we anticipate the extreme-case analysis will show compliance for antennas at the lowest practicable elevation.

As the Board knows, as long as the proposed facility will be compliant with the FCC RF emissions exposure requirements (47 CFR §1.1310), the Board has no further authority to regulate the placement of the facility on the basis of its emissions. The RF engineer certified that the facility will be compliant with the FCC RF emissions exposure regulations, but there is no computational documentation. The Board should decide whether such computational documentation is necessary. In addition, the Commonwealth of Massachusetts Department of Public Health no longer processes approval requests for RF emitters.

The noise emissions of the facility are not regulated in the zoning bylaw. There is a noise regulation for Major Commercial Projects (which the proposed facility is not) that could be utilized as a guide (9.3A.4.2). It states that the noise level generated by the new project should not be more than 10 dB above the ambient (background) level. The regulation also states the absolute level of noise of the project at an affected property's boundary may not exceed 70 dBA. This is about the noise level experienced while vacuuming. The ambient-plus-ten dB limit is also the limit established by the Massachusetts Department of Environmental Protection, which regulates noise under state law as an air pollutant.

The proposed facility will not be audible outside the property¹. The noise analysis provided by the applicant indicates the proposed facility's noise levels at the property lines will be substantially less than 30 dBA. It is generally the case that nighttime background noise levels in truly rural areas tends to range between 30 and 35 dBA. The presence of human driven noise sources, such as from streets, aircraft and residences, tends to increase the noise levels above that generated by natural noise sources such as insects, birds and wind. The applicant's noise analysis is an extreme-case analysis (analogous to the extreme-case RF energy analysis) that calculates the decay of noise over distance, but does not include the decay of noise levels due to the intervening vegetation and terrain. The result is a conservative overestimation of the noise levels at the property lines.

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¹ This conclusion assumes that the general noise of the facility remains relative broadband and does not develop a single-pitch sound such as a squeak or whistle of sufficient level to significantly increase the noise emitted by the facility. Generally such facilities generate broadband noise from the operation of fans and air conditioners.